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Regional Broadband Utilization Analysis in the Commonwealth of Kentucky

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Kentucky.gov

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Summary

Many communities and regions across Kentucky face significant challenges, among them economic dislocation and an aging population. Most rural areas face the additional challenge of population shifts from rural to urban areas. In the face of these challenges, how can communities and businesses maximize their competitiveness, while improving their quality of life?

One area with significant potential is broadband (essentially high-speed Internet), which can be leveraged into tangible benefits for communities, businesses and households. Businesses can become more productive, competitive and reach into new markets. Households can access services more easily and often more cheaply. Governments can delivery services more cost effectively.

The first step in benefiting from broadband is acquiring connectivity or access to the Internet. Once access is acquired, the second step is adoption, whereby households, businesses and other organizations begin to use their high-speed Internet on a regular basis.

The third stage in broadband development is utilization of the Internet in increasingly productive ways that bring concrete benefits, such as job, new savings and revenues, and improved quality of life. This report focuses on utilization as the third stage of broadband development.

Research in other States has shown a strong relationship between use of the Internet, revenues and jobs. Evidence on the relationship between job creation and revenue growth in Kentucky will be included in a report to be developed in early 2012 after a second and more comprehensive round of data collection slated to occur in early 2012.

Utilizing Broadband

The ability to utilize or leverage broadband varies significantly across businesses, organizations and households. Not all businesses or households have been able to turn the potential of broadband into measurable success in terms of jobs, company attraction and retention, increased tax base and revenues, and more efficient and effective citizen services. Turning potential into reality requires skills, training, and both formal and informal support, all in addition to access to broadband connectivity.

In those industry sectors and communities that already have a large, diverse and modern economy and work force, building broadband infrastructure may be sufficient to realize the potential of broadband. However, many industry sectors, communities, businesses and households have limited Internet related skills and capacity. For these groups, even with state-of-the-art connectivity, leveraging broadband often lags. The consequence is that these communities (and households and businesses) lose out on many of the benefit of broadband. More importantly, over time, these communities are at risk of becoming economically uncompetitive and generally less attractive to households and businesses.

This report is part of an initiative by the Commonwealth of Kentucky that supports development of broadband infrastructure, adoption and utilization. The benchmarking of Internet utilization in Kentucky began with collection of a limited data set, as part of the Commonwealth's Internet mapping process in 2010.* This report represents an analysis of this data from a regional perspective, in anticipation of a more comprehensive data collection effort during the 1st quarter of 2012. One outcome from this new comprehensive benchmarking will be a detailed analysis of the commonwealth and its regions, with information on economic impacts of broadband utilization. This regional analysis will be designed to support regional planning processes with customized analysis.

Recommendations

To assist stakeholders and communities to better understand and use this report, the recommendation of the report have been structured around fundamental questions the leaders and decision-makers face in terms of leveraging broadband for the socio-economic benefit of their communities and constituents.

1. How important is high-speed Internet to Kentucky, its communities and its residents?

In the twenty-first century, high-speed Internet has been an essential part of a region's infrastructure, a business's internal and external operations, and a household's participation in their community life. Availability and meaningful use of high-speed Internet speaks directly to a community's viability, competitiveness and quality of life. However, each region and community has its own unique characteristics, assets and challenges. Current Internet usage and opportunities for development vary widely, as explored in detail in the various sections of this report. This is summarized in Table 3 on page 14 for organizations and Table 18 on page 28 for households. Each region requires strategies and initiatives that address its unique situation. The Commonwealth can provide support, but social and economic developments are essentially local and regional in nature

Over 10% of households would "definitely" relocate to another community for broadband service if it was not available to them in their current location. Another 18% would consider relocation "very likely". Broadband was also considered "essential" for selecting location by 33% of businesses and other organizations, as well as "essential" for remaining in location by 56% of organizations. (e-Solutions Benchmarking Report for Kentucky, May 2010).

Recommendation #1: *Each region must develop its own strategy and initiatives based on its own characteristics, values and priorities.*

* A summary of the preliminary findings from this initial benchmarking can be found in the e-Solutions Benchmarking Technical Report (May 2010). The 2010 Technical Report is largely descriptive and does not include much of the analysis nor recommendations included in this report.

2. Where are the major gaps or weaknesses in utilization of the Internet?

Prioritizing industry sectors and other economic groups must be done within a regional context. While factors such as industry size within each region are considered in this report in Section 3.1.2, additional factors and considerations exist within each region, such as key industry sectors in decline or regional strategies for developing specific sectors. In general, focus should be on industry sectors that make the largest contribution to the economy and that have the greatest growth potential.

Key gaps in Internet utilization are focused on household income, age, and skill level, degree of "rurality", and organizational size and industry sector.

Recommendation #2: *Focus on high opportunity industry sectors within each region rather than undertaking broad but untargeted initiatives.*

3. How do we use the potential of the Internet to maximize job creation?

Small to medium sized organizations should be a focus for all regions. This segment, considered in Section 3.2, is important for the following reasons:

- Includes 95% of all establishments and 43% of all employment in Kentucky
- Lowest utilization level compared to organizations with larger numbers of employees
- Dynamic engine for employment growth, especially through use of the Internet
- Least capacity and expertise to adopt more sophisticated Internet applications

Recommendation #3: *Focus on the small-medium enterprise segment, especially 1-19 employees, to increase Internet utilization, thereby driving competitiveness, revenues and job creation.*

4. In what areas do small to medium sized business need help?

E-Solutions Benchmarking identifies which types of Internet enabled applications and processes are relatively easy or hard to adopt, especially by small to medium sized organizations, as evidenced in the tables in the later part of Section 3.2. Together with data on barriers to adoption, action plans can be defined at the regional level to address target groups.

Recommendation #4: *Initiatives aimed at increasing utilization among the small to medium enterprise segment should focus on the following 10 utilization categories:*

1. *Delivery of services and content*
2. *Rich media or service creation*[1]
3. *Teleworking*
4. *Staff training and skills development*
5. *Advertising and promotion*
6. *Social networking*
7. *Government transactions*
8. *Customer service and support*
9. *Selling goods or services*
10. *Supplier communication and coordination*

5. How can we help citizens of Kentucky make better use of the Internet?

> The poorer one is and the older one is, the less one uses the Internet.

Households with low computer skills represent an important group due to the social and economic benefits that can be accessed through the Internet. As governments and businesses move their services to the Internet to achieve better reach and cost efficiencies, it is increasingly important that citizens have the ability to access and benefit from these online services. However, a large portion of lower income and older households have difficulty adopting and using the Internet, as described in Section 4.2. Given that low adoption and utilization is strongly tied to age and income, training should be targeted at people over 55 with low to moderate income.

Recommendation #5: *Develop training programs and resources that target lower to middle income households over the age of 54.*

6. Is it true that the rural areas have a particularly hard time in adopting and using the Internet?

Yes! While both urban and rural households struggle to use and benefit from the Internet, information in Section 4.2 reveals that rural households are relatively disadvantaged, being generally older and having lower average incomes. For example, significant variations exist in Internet utilization levels among the four regions in Kentucky. With two large metropolitan centers, the Bluegrass region shows the highest overall utilization levels and has the greatest capacity to benefit from the Internet. The remaining regions show a more diverse pattern of Internet use, one that is consistently below the state average. Consequently, rural

[1] Rich media describes Web pages that use advanced technology such as streaming video, downloaded programs that interact instantly with the user for advertising.

households tend to have greater difficultly in accessing educational, health and government services, all of which are increasingly available online.

Recommendation #6**:** *Non-metropolitan areas are a priority for Internet training programs and resources.*

7. How can we reach those households that have not adopted the Internet or use it only minimally?

Rather than trying to entice target populations into existing programs (such as classroom courses), research discussed in Section 4.4 shows that Internet training initiatives should reflect the preference for both self-directed online resources, as well as existing informal networks that already have participation by these target groups. These can include senior's centers, libraries, churches and community centers.

The preferred learning methods of 47% of those over 65 in Kentucky are "talking to others" and "online information". The least preferred learning methods were "workshops" and "classrooms courses" (preferred by 16%).

Recommendation #7: *In designing initiatives to increase and improve Internet utilization by households and organizations, considerable weight should be given to those learning methods that are preferred by the target populations.*

1. Introduction

This report examines how organizations and households in Kentucky differ in their utilization of broadband and where they can look to make improvements. The report shows in detail how different industry sectors and household types compare to each other, especially between and within regions. The report provides insights and hard evidence that allows regions, businesses, and households to assess where they stand, as well as to identify what kinds of actions will improve their performance and benefits.

The report includes recommendations for how the Commonwealth of Kentucky and its regions can improve the utilization of broadband, thereby improving their economies and quality of life. Recommendations are broken down into three areas: gaps and opportunities where regions are lagging in their use of the Internet and broadband; key barriers to improving the use and benefits of Internet and broadband; and the best ways to build skills and abilities. Analysis and recommendations are identified for both organizations (commercial and non-commercial) and households.

For the purposes of this report, regional analysis has been organized into four distinct regions of Kentucky: Bluegrass, East, West, and South. The composition of these four regions is outlined in Appendix 1.

*This report uses data collected in 2010 across Kentucky. Over 2,073 organizations and 1,454 households contributed to the broadband benchmarking effort.**

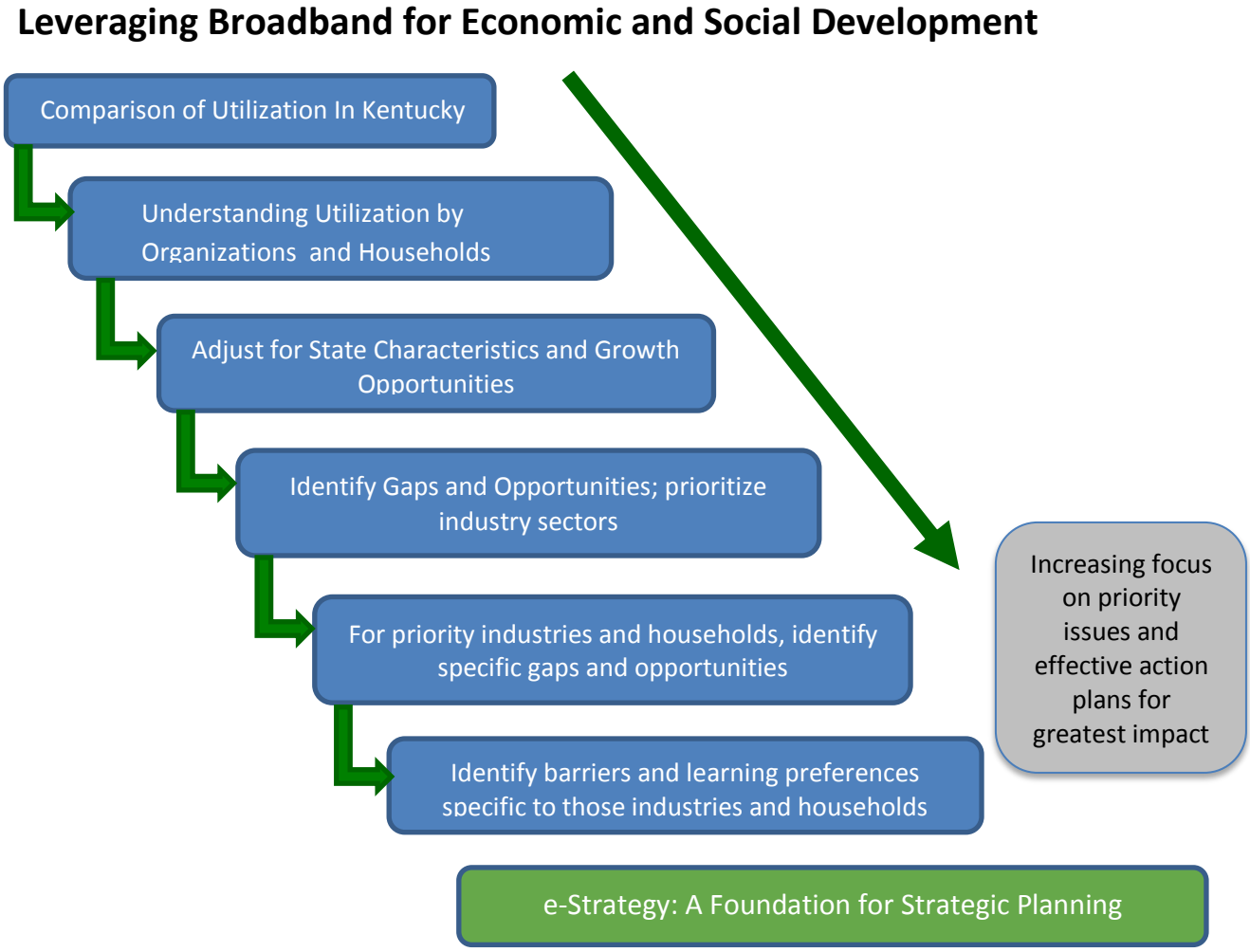
* This number of responses is substantial, especially when compared to national polls. A typical national poll by Gallup includes 1,000 completed interviews. The e-Solutions benchmarking sample is considerably larger, especially considering that it based solely on the Commonwealth of Kentucky. However, the e-Solutions Benchmarking sample cannot be considered a random sample.

2. Starting Points

2.1 Organization and Objectives of the Report

This report is designed to be a catalyst for leveraging broadband through actionable intelligence. The chart below outlines the steps used in this report to move from descriptive data to detailed information on targets, priorities and strategies. The ultimate goal of the regional analysis of broadband in Kentucky is to:

1. Identify which segments of the regional economy utilize the Internet to a greater or lesser degree;
2. Prioritize the segments that show utilization gaps based on importance to the regional economy and opportunity to address the gaps; and,
3. Identify specific uses of the Internet that should be addressed to close the gaps, resulting in effective actions that are targeted where they will have the most impact.
4. Identify the barriers to improved Internet utilization, as well as the best means to overcome them.



2.2 Introducing the Digital Economy index (DEi)

This report includes extensive comparisons of Internet use between regions by various characteristics, such as industry, business size, and household demographics. To assist in the process of making comparisons, SNG developed the Digital Economy index (DEi) for organizations. Drawing on the 17 utilizations categories noted below, a composite score is developed that summarizes how comprehensively each organization uses Internet-enabled e-solutions (applications and processes) to drive efficiencies, innovation, and profitability.

An individual organization's DEi score (from 0 to 10) captures that organization's utilization of e-solutions, with 10 being the highest possible use and 0 being e no utilization. DEi scores are averaged across groups of users by various categories: e.g. a region's DEi is the average for all organizations in that region.

DEi Meter from dashboard of SNG's Digital Economy Analytics Platform.

Similarly, an industry's DEi is the average of all organizations in that industry. The DEi can be used to compare an organizations, regions, or industry sectors. A separate DEi is used to compare how different types of households use the Internet. The household DEi is derived from the 30 household utilizations noted below.

The DEi is used extensively throughout this document as a basis for comparison of utilization levels across various dimensions. Identifying variations in DEi assists in focusing on areas where a deeper assessment is warranted. In areas where DEi is lower than average, indicating lower utilization levels, there is an opportunity to increase utilization and the resulting benefits to organizations and households. The report uses the following utilization categories (e-Solutions) that cover a range of activities important in tracking how organizations and households use their Internet and broadband connections.

e-Solutions refer to the integration of Internet technologies with the internal computer-based systems and applications within or among organizations for a variety of operational processes. e-Solutions encompass not only product delivery and payment transactions (e-commerce) but also all processes that may be facilitated by computer-mediated communications over the Internet.

e-Solutions Categories for Organizations	
e-Commerce Related	***e-Process Related***
Selling goods or services	Purchasing goods or services
Deliver services and content	Supplier communication and coordination
Rich media or service creation	Electronic document transfer
Customer service and support	Staff training and skills development
Advertising and promotion	Teleworking
Social networking	Accessing collaborative tools
Web site for organization	Banking and financial
Research by staff	Government transactions
	Access government information

e-Solutions Categories for Households	
Communication	***Transactions***
E-mail	Buying goods or services
Voice over IP	Selling items
Online chat	Investments / trading
Sharing information	Online banking
Personal website	Paying bills
Productivity	Government services
Education or training courses	Music or video download
Accessing workplace	Software download
Teleworking	Booking travel
Home business	***Research***
Recreation	Product information
News and sports	Investments
Listen to radio	Government information
Watch TV programs	Community events
Watch movies	Education and training
Online gaming	Health information
	Travel information

3. Broadband Utilization by Organizations

3.1 How regions differ in broadband utilization

It is natural that organizations will differ in their utilization of broadband and Internet infrastructure. Research shows that productive use of the Internet and e-solutions is related to the size and density of a community or region, the types of industry sectors that make up its economy, the level of diversification of its economy, and the income, age and education of its citizens. This report explores how the make-up of the regions of Kentucky impacts their use of the Internet, as well as their ability to benefit from the potential that the Internet offers to communities, businesses and households.

At the broadest level, how do the regions of Kentucky compare in their use of the Internet? Table 1 presents the results of data collected in its simplest form. Not surprising, the Bluegrass region with its diverse economy and large metropolitan base, shows the highest level of utilization of the Internet. The three other less urban regions have a noticeably lower level of use, with the East lagging the most.

TABLE 1: How Regions Rank in Internet Use (Commercial and Non-commercial Organizations)

Region	Rank	Average DEi Score	Difference from Average	Sample size
Bluegrass	**1**	6.39	0.32	1,083
South	**2**	5.84	-0.23	321
West	**3**	5.83	-0.24	375
East	**4**	5.38	-0.69	271
State Average		6.07		2,050

These rankings include organizations across all industry sectors and employment sizes. To understand why the regions differ in their Internet utilization levels, it is very instructive to explore:

1. How utilization varies by industry.
2. How employment size affects utilization.
3. Which Internet applications and processes are slowest to be adopted.

3.1.1 Utilization by Industry

Before diving into the details of how industry sectors perform and vary, it is important to understand the make-up of the regional and state economies in Kentucky. This report uses US Census Bureau (USCB) data[2] on annual payroll to gauge the importance of industry sectors for each region. Annual payroll for an industry expresses the relative importance of an industry sector, as this represents personal income that flows into the economy and indirectly reflects levels of employment.

[2] Industry data is sourced from USCB County Business Patterns for 2009.

The following table shows the ranking of the top 8 industry sectors[3] (excluding Public Administration) by region and statewide based on total annual payroll. The percentage of payroll, employment, and establishments represented by these top 8 industry sectors are included for reference. The top 8 industry sectors typically represent between 70% and 80% of the regional economies.

TABLE 2: Top 8 Industry Sectors by Region based on Total Payroll

Rank	Bluegrass	East	South	West	Statewide
1	Health Care & Social Assistance	Health Care & Social Assistance	Health Care & Social Assistance	Manufacturing / Processing	Health Care & Social Assistance
2	Manufacturing / Processing	Mining	Manufacturing / Processing	Health Care & Social Assistance	Manufacturing / Processing
3	Wholesale Trade	Retail Trade	Retail Trade	Retail Trade	Retail Trade
4	Finance & Insurance	Manufacturing / Processing	Construction	Construction	Wholesale Trade
5	Retail Trade	Wholesale Trade	Accommodation & food services	Wholesale Trade	Finance & Insurance
6	Professional & Technical Services	Accommodation & food services	Finance & Insurance	Transportation & Warehousing	Professional & Technical Services
7	Construction	Construction	Wholesale Trade	Finance & Insurance	Construction
8	Management of companies & enterprises	Transportation & Warehousing	Professional & Technical Services	Accommodation & food services	Accommodation & food services
% Payroll	70.6%	73.8	76.0%	76.2%	78.5%
% of Employ't	70.6%	71.0%	77.1%	76.7%	79.0%
% of Establish't	77.3%	78.8%	79.5%	77.3%	77.5%

The 2010 e-Solution Benchmarking database for Kentucky has good data sets for all industry sectors in the above table with the exception of Mining and the Management of Companies industry sectors.

Internet utilization varies by industry and region. The following table summarizes the utilization (average DEi score) for each industry by region and statewide. Not surprisingly, the industry sectors with the highest

[3] Industries are based on 2-digit NAICS code level data from USCB County Business Patterns 2009. Full names of industries from NAICS definitions are abbreviated for this table. USCB County Business Patterns data does not include Public Administration (government). It should be noted that there can be significant difference in ranking of industries based on payroll vs. employment, e.g. Retail Trade tends to rank higher in employment due to comparatively lower wage rates, whereas Finance & Insurance ranks higher in payroll compared to employment.

utilization state-wide are the Information, Finance and Wholesale. However, the ranking of industry sectors varies between regions.

The SNG Color Coding for DEi Scores

To better show how industry sectors perform within a region, the DEi tables in this report are color coded from the highest (green) to lowest (red) to highlight how DEi scores compare.

The color coding (green to red) is relative within each region and allows one to quickly compare regions based on how industry sector utilization scores vary within each. Statewide DEi scores are also shown for reference, ranked from highest to lowest.

Highest
2
3
4
5
6
Lowest
Insufficient Data

TABLE 3: Comparison of Utilization by Region and Industry (based on DEi score)

Major Industry Sector	Statewide	Bluegrass	East	South	West
Information	7.32	7.63	6.40	7.64	7.29
Finance & Insurance	6.71	7.30	6.57	6.20	5.75
Wholesale Trade	6.69	7.23		6.53	6.13
Manufacturing / Processing	6.48	6.74	6.34	6.24	5.75
Educational Services	6.36	6.19		6.75	5.75
Professional & Technical Services	6.31	6.84	5.53	5.47	5.48
Other services (exc. public admin)	6.20	6.63	4.99	5.91	6.17
Retail Trade	6.11	6.28	5.83	4.93	6.75
Construction	5.84	6.07		5.83	5.88
Health Care & Social Assistance	5.48	6.12	4.58	5.20	5.03
Public Administration	4.73	4.74	3.84	5.13	4.95

While the preceding table shows how different industry sectors compared to each other ***within*** a given region, another valuable way to compare Industry performance is to compare how an industry in one region compares to the same industry sector in other regions. This highlights the competitiveness and relative performance of a region and its industry sectors. As an example, the Information industry in the South has higher utilization than Information industry in the other regions.

TABLE 5: Ranking of Industry Sectors across Regions

Major Industry	Bluegrass	East	South	West
Information	2	4	1	3
Finance & Insurance	1	2	3	4
Wholesale Trade	1		2	3
Manufacturing / Processing	1	2	3	4
Educational Services	2		1	3
Professional & Technical Services	1	2	4	3
Other services (exc. public admin)	1	4	3	2
Retail Trade	2	3	4	1
Construction	1		3	2
Health Care & Social Assistance	1	4	2	3
Public Administration	3	4	1	2

3.1.2 Variation in Utilization: Gaps and Opportunities

High variation in utilization of Internet applications and processes (referred to in this report as e-solutions) is a possible indicator of a lack of competitiveness, though it is also an indicator that these are areas with potential for improvement, given what similar organizations are doing within the same industry. In regions with poor rankings, Industry Sectors that show the highest variation in utilization compared to other regions are candidates for initiatives to increase utilization and thereby stimulate economic competitiveness and development.

TABLE 6: Industries with Significant Variations in Utilization across Regions

Industry	Variation between lowest and highest DEi	Variance as % of DEi Score	Rank of Industry by Size	Average DEi	Sample Size
Retail Trade	1.82	29.8%	3	6.11	138
Finance & Insurance	1.55	23.1%	5	6.71	135
Health Care & Social Assistance	1.54	28.1%	1	5.48	180
Professional & Technical Services	1.37	21.7%	6	6.31	183
Public Admin	1.29	27.3%	N/A	4.73	315
Information	1.23	16.8%	13	7.32	118
Wholesale Trade	1.1	16.4%	4	6.69	80
Educational Services	1.00	15.7%	16	6.36	219
Manufacturing & Processing	0.99	15.3%	2	6.48	134
Construction	0.24	4.1%	7	5.84	107

In Kentucky, the industry sectors with the highest variation in utilization are also the largest sectors of the economy, indicating that these industry sectors are priorities.

However, the process of prioritizing an industry sector also includes assessing its potential for creating new jobs and protecting existing jobs. An industry sector that is uncompetitive is unlikely to create new jobs and is at risk of losing existing jobs. A competitive industry is more likely to retain existing jobs and more likely to create new jobs, especially in an expanding industry. In this context, it is worth noting the jobs growth forecast in Kentucky for the 12 month period November 2011 to November 2012, by Moody Analytics[4].

TABLE 7: Projected Employment Growth – November 2011 to November 2012

Industry	Percent Growth
Kentucky – All Industry Sectors	1.4%
Construction	4.6%
Education and Health	3.2%
Leisure and Hospitality	2.8%
Manufacturing	2.1%
Retail	1.1%
Professional & Technical Services	1.1%
Transportation & Warehousing	0.0%
Financial Services	-0.9%
Information services	-1.4%

It should be noted that over a longer forecast period, to 2015, Manufacturing's growth is expected to be very modest, while other areas such as Education and Health, Leisure and Hospitality, and Professional and Technical Services are projected to have healthy growth rates.

Regions will benefit by closely examining the gaps and opportunities by industry sectors as part of their focused efforts to increase e-Solution utilization for each region. The following table identifies where the largest gaps in performance are, by industry and region. Areas identified as "1" have the greatest gap, followed by those identified as "2" which have smaller, but still significant gaps.

[4] See http://www.usatoday.com/money/economy/story/Jobs-Forecast-2011/34083932/1

TABLE 8: Lagging Industry Sectors: Gaps and Opportunities for Increasing Utilization by Region

Major Industry Category	Bluegrass	East	South	West
Construction	0.24	-1.40	0.00	0.04
Educational Services	0.49	-0.28	-0.20	-0.70
Finance & Insurance	0.59	-0.13	-0.51	-0.96
Health Care & Social Assistance	0.64	-0.90	-0.28	-0.45
Information	0.31	-0.92	0.32	-0.04
Manufacturing / Processing	0.26	-0.13	-0.23	-0.72
Other services (exc. public admin)	0.43	-1.21	-0.28	-0.03
Professional & Technical Services	0.54	-0.77	-0.84	-0.83
Public Administration	0.01	-0.89	0.40	0.23
Retail Trade	0.17	-0.28	-1.19	0.64
Wholesale Trade	0.54	-2.46	-0.16	-0.56
Gap 1 (0.6 or more below the state DEi)	0	7	2	4
Gap 2 (0.6 to 0.3 below statewide DEi)	0	0	1	2

Recommendation #1: Each region must develop its own strategy and initiatives based on its own characteristics, values and priorities.

In the twenty-first century, high-speed Internet is an essential part of a region's infrastructure, a business's operations, and a household's participation in their community life. Availability and meaningful use of high-speed Internet speaks directly to a community's viability, competitiveness and quality of life. However, each region and community has its own unique characteristics, assets and challenges. Each region requires strategies and initiatives that address its unique situation. The Commonwealth can provide supports, but social and economic development are essentially local and regional in nature.

Recommendation #2: Rather than undertaking broad but untargeted initiatives, focus on industries that have the highest economic contribution and highest growth potential within each region.

Industry utilization levels vary significantly across the regions. Even lagging regions lead in some industries while leading regions lag in others. Where industry utilization lags in a region there is an opportunity to increase utilization levels and thereby increase competitiveness, revenues and job creation. The lagging industries for Internet utilization in each region are identified in this report. Setting priorities industries should also take into consideration the size and importance of each industry to the region.

3.2 What Contributes to the Different Levels of Utilization?

A number of factors help to explain differences in utilization between organizations and between regions. Location of an organization in a non-metropolitan area is one such factor. Organizations outside of a metropolitan area do not benefit from the dense network of supports and skilled labor pool. Larger organizations (with 20 or more employees) seem to be able to compensate for this disadvantage. However, as Table 9 shows, smaller organizations located outside of a metropolitan area[5] suffer a distinct disadvantage, with resulting lower levels of utilization of e-solutions. This factor partly explains why the three less metropolitan regions of Kentucky (see Table 10) trail the Bluegrass region in Internet utilization.

TABLE 9: Impact of Location on Utilization, by Size of Organization

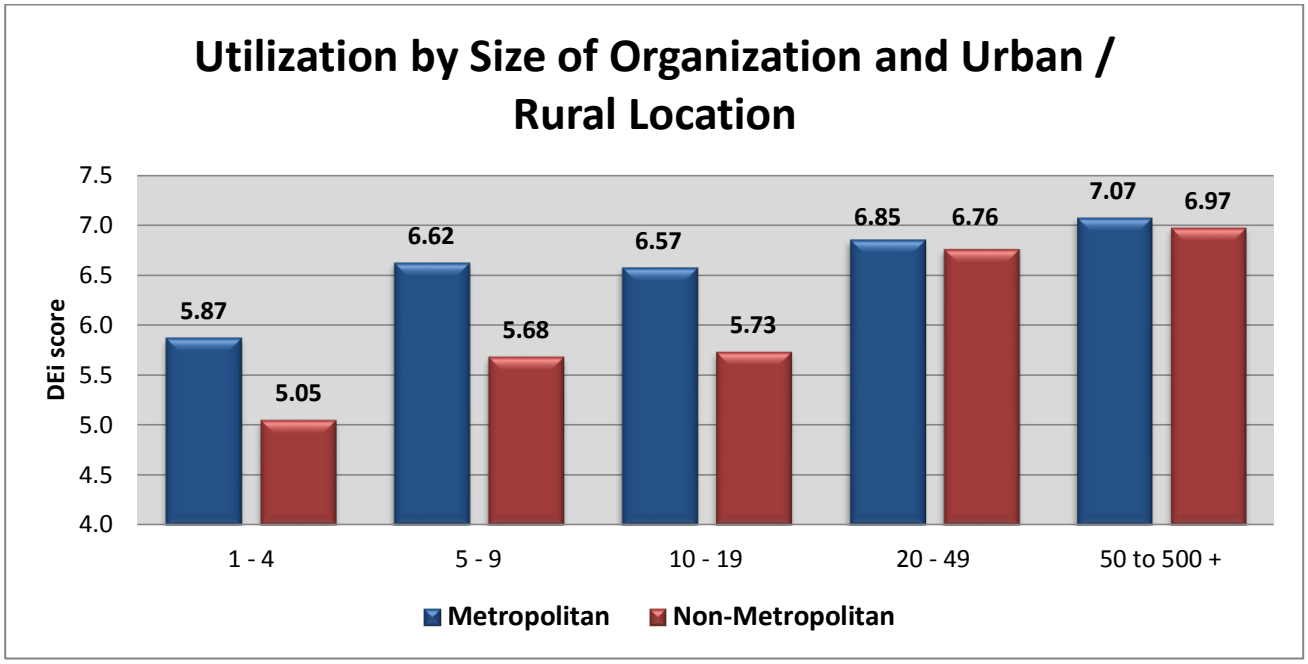


TABLE 10: Distribution of Respondent Sample by Settlement Pattern

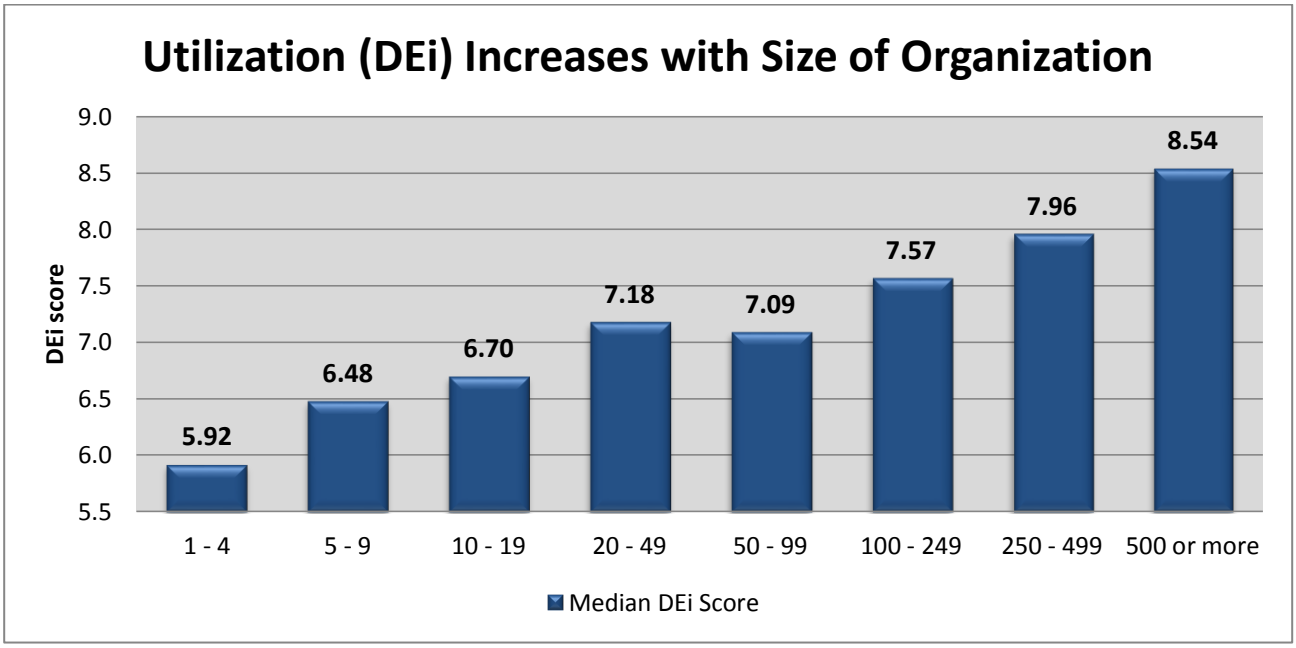
Type of Settlement Pattern	Bluegrass	East	South	West
Metropolitan	72.5%	14.4%	22.7%	18.7%
Micropolitan	19.8%	11.1%	33.6%	38.1%
Small Town	5.8%	44.3%	24.0%	21.6%
Isolated Small Town	1.9%	30.3%	19.6%	21.6%
	100.0%	100.0%	100.0%	100.0%

A second very important factor is organizational size as average utilization increasing for organizations with larger numbers of employees. The pattern of lower utilization by smaller firms appears related to the

[5] A metropolitan area is defined by the Census Bureau as having a core urban area of over 50,000 with a population density greater than 1,000 people per square mile. A Micropolitan area has a population of 10,000 to 49,999. A small town has a population of 2,500 to 9,999. The category of "isolated small town" includes the remainder.

greater resources available to larger entities, as evidenced later in the report's section on barriers to utilization.

Table 11: Variation in Utilization by Size or Organization



This importance of organizational size as a factor in e-solutions utilization is made more obvious when one realizes that almost 95 percent of establishments and 42.9 percent of employment across Kentucky falls into the 1-49 employee category, so lower utilization among this major segment provides a strong argument for making this segment a focus for promoting broadband utilization. Moreover, the three non-metropolitan regions in Kentucky have a higher percentage of businesses and organizations with 1 – 19 employees, compared to the Bluegrass region. Using data from the 2009 US Census, the following tables demonstrate the importance of smaller organizations to the regional and state economies.

TABLE 12: Number of Establishments by Employment Size Range (USCB County Business Patterns 2009)

Employment Range	Bluegrass	East	South	West	Statewide
1 to 19	83.8%	86.9%	86.6%	86.4%	85.0%
20 to 49	10.0%	8.7%	8.7%	8.8%	9.5%
50 to 99	3.4%	2.3%	2.4%	2.5%	3.0%
100 to 499	2.6%	1.9%	2.0%	2.0%	2.3%
500 or more	0.3%	0.2%	0.3%	0.2%	0.2%

The small to medium enterprise (SME) segment is not only a significant component of statewide and regional economies, it also tends to be a primary source of new job growth and the segment with the

greatest opportunity to increase utilization levels for productivity and competitiveness. Larger organizations in general have had access to information and communications technology (ICT) for much longer periods and have the internal resources to take advantage of these technologies, resulting in higher utilization. As such, larger organizations are less likely to be influenced by external broadband adoption and utilization initiatives and already have high utilization levels.

Compared to larger organizations, the utilization levels for smaller organizations could be increased by at least 10 percent and in some cases

Recommendation #3: Focus on the small-medium enterprise segment, especially 1-19 employees, to increase Internet utilization, drive competitiveness, revenues and job creation.

Small to medium sized organizations should be a focus for all regions for the following reasons:

- Largest number of establishments (95%) and significant employment (43%)
- Lowest utilization level compared to larger employment segments
- Dynamic engines for employment growth, especially through use of the Internet
- Least capacity and expertise to adopt more sophisticated Internet applications

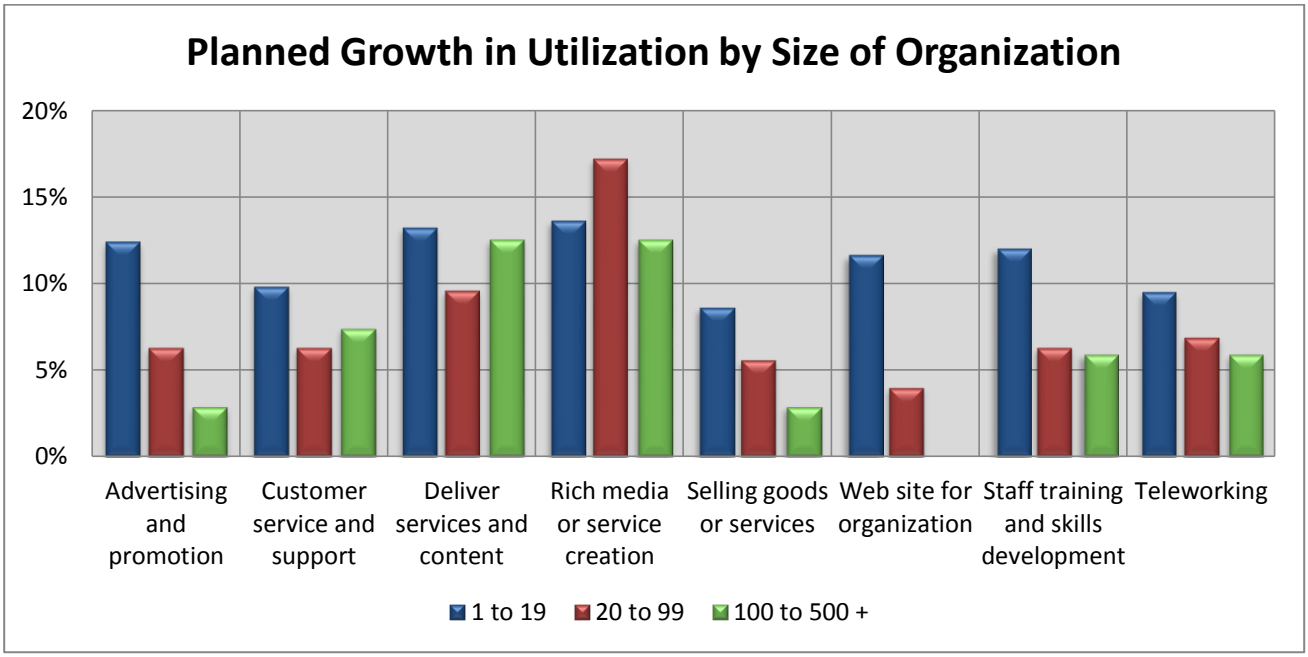
Where Utilization Differences Occur in SME Organizations: Some processes and applications are easier to adopt than others, such as electronic document transfer, staff research, and accessing government information. Adoption levels of these utilizations are high and there is not much variation between sophisticated and less sophisticated users. While some smaller enterprises may not aspire to the utilization levels of large organizations and some types of utilization may be less appropriate for small organizations, it is instructive to observe where the differences lie in utilization between small and large organizations. The utilization levels of larger organizations provide potential targets for smaller organizations to achieve. Table 12 shows utilization levels of different e-solutions for small (1-19 employees), medium (20 to 99) and large (100 to 500 plus employees) organizations.

TABLE 13: Variation in Specific e-Solutions by Size of Organization

Currently Used Processes or Applications	1 to 19	20 to 99	100 to 500 +
Teleworking	40.4%	58.1%	71.3%
Staff training and skills development	63.5%	83.5%	89.0%
Deliver services and content	32.1%	49.8%	55.9%
Web site for organization	73.6%	89.8%	97.1%
Rich media or service creation[6]	35.5%	50.2%	58.1%
Advertising and promotion	52.6%	62.4%	74.3%
Supplier communication and coordination	69.2%	74.6%	86.8%
Government transactions	56.5%	66.3%	73.5%
Access government information	82.2%	90.4%	91.9%
Selling goods or services	41.0%	41.6%	49.3%
Research by staff	83.2%	89.1%	91.2%
Purchasing goods or services	72.8%	80.2%	77.9%
Customer service and support	62.2%	64.0%	69.1%
Electronic document transfer	82.6%	89.1%	88.2%
Banking and financial	58.8%	52.8%	54.4%

With the exception of banking and financial services, smaller organizations have lower utilization of all e-solutions. Many smaller organizations were already planning to address these gaps, as seen in the following table which shows which e-solutions organizations were planning to adopt within a 12 month period.

TABLE 14: Planned Adoption of Specific e-Solutions by Organization Size



[6] Rich media describes Web pages that use advanced technology such as streaming video, downloaded programs that interact instantly with the user for advertising.

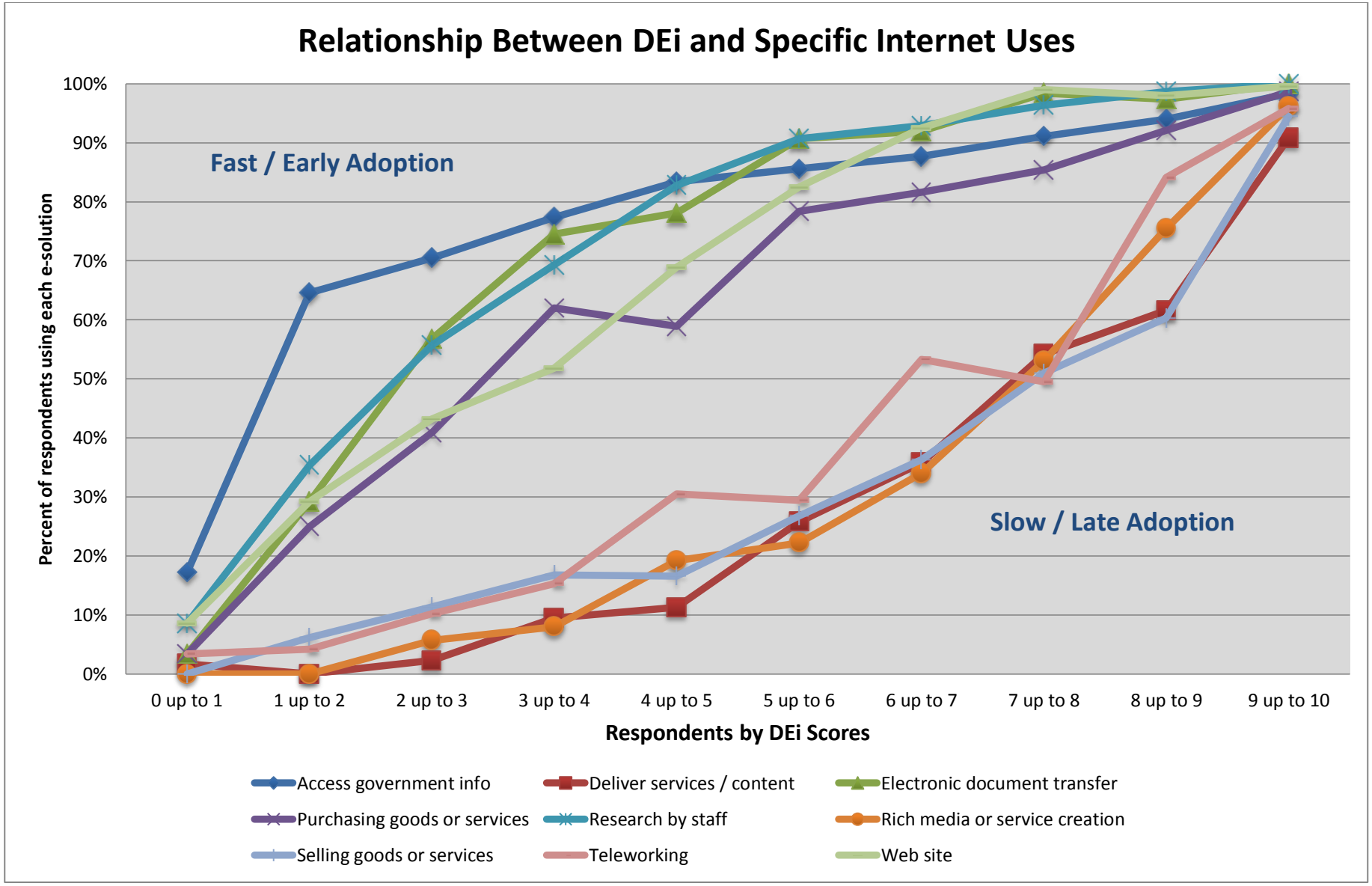
By combining data from the two previous tables, an assessment can be made of which opportunities offer the greatest potential for small businesses and where they may need assistance.

TABLE 15: Identifying e-Solutions with Greatest Variation in Utilization and Planned Use

Currently Used Processes or Applications	Variance By Organization Size	Planned Use by Small Organizations (1 to 19 employees)
Teleworking	30.9%	9.5%
Staff training and skills development	25.5%	12.0%
Deliver services and content	23.8%	13.2%
Web site for organization	23.5%	11.6%
Rich media or service creation	22.6%	13.6%
Advertising and promotion	21.7%	12.4%
Supplier communication and coordination	17.6%	5.1%
Government transactions	17.0%	7.5%
Access government information	9.7%	3.5%
Selling goods or services	8.3%	8.6%
Research by staff	8.0%	3.8%
Purchasing goods or services	7.4%	6.0%
Customer service and support	6.9%	9.8%
Electronic document transfer	6.5%	4.7%
Banking and financial	6.0%	6.9%

In designing initiatives to support small businesses, it is valuable to be aware of the evidence that many types of utilization are more complex and sophisticated in nature making them slower to be adopted by organizations in general and by smaller organizations in particular. The chart on the next page shows the rate that each type of utilization is adopted by organizations relative to DEi scores. Those with lower utilization adopt the easier to use applications first while more sophisticated and difficult applications tend to be adopted later, especially by organizations that already have high utilization.

Quick to adopt	Slow to adopt
Access government information	Teleworking
Electronic document transfer	Rich media or service creation
Purchasing Goods and Services	Selling goods or services
Research by staff	Deliver services or content
Web site	


Relationship Between DEi and Specific Internet Uses
Fast / Early Adoption
Slow / Late Adoption
Percent of respondents using each e-solution
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 up to 1
1 up to 2
2 up to 3
3 up to 4
4 up to 5
5 up to 6
6 up to 7
7 up to 8
8 up to 9
9 up to 10
Respondents by DEi Scores
Access government info
Deliver services / content
Electronic document transfer
Purchasing goods or services
Research by staff
Rich media or service creation
Selling goods or services
Teleworking
Web site

Recommendation #4: Initiatives aimed at increasing utilization among the small to medium enterprise segment should focus on the following 10 utilization categories:

1. Delivery of services and content
2. Rich media or service creation
3. Teleworking
4. Staff training and skills development
5. Advertising and promotion
6. Social networking
7. Government transactions
8. Customer service and support
9. Selling goods or services
10. Supplier communication and coordination

Once industries and segments are targeted for each region, the specific utilization categories that represent gaps and opportunities should be targeted.

3.3 How Differences in Utilization Matter

Does more intensive use of Internet applications and processes really matter? e-solutions benchmarking efforts undertaken by Strategic Networks Group in other states has shown a strong relationship between utilizations levels and beneficial impacts. The Kentucky e-Solutions Benchmarking initiative in 2010 did not collect information on this crucial area. However, a new data collection exercise will be undertaken across Kentucky in the first quarter of 2012 and will collect data on how utilization of e-solutions impacts on job creation, savings in operating costs and contribution to revenue. An updated version of this report due in early 2012 will contain data analysis on this important area.

3.4 Barriers to Improved Utilization

So we now know which industry sectors in which regions have the greatest gaps. As well, we have additional information needed to prioritize industry sectors, such as impact of size of organization and impact of sector on regional economy. We also know in which specific areas (applications and processes) these industry sectors and priority groups are lagging. Improving the performance of these groups is critical to the competitiveness and health of regional economic development, including achievement of such objectives as job creation.

Before a plan can be designed to support these priority groups it is important to understand the barriers to adoption of e-solutions. The following table identifies the importance of a range of factors in inhibiting the adoption and use of e-solutions by organizations.

TABLE 16: Barriers to Adoption of e-Solutions – Regional Comparison to Statewide Averages

Barrier to Using e-Solutions: Very or Somewhat Important	All organizations	Organizations with 1 - 49 employees			
	Statewide	Bluegrass	East	South	West
Security concerns	63.6%	63.6%	64.3%	68.3%	60.9%
Privacy concerns	61.1%	60.8%	61.1%	65.3%	58.5%
High cost of development/maintenance	51.3%	51.6%	53.9%	50.3%	51.5%
Lack of internal expertise	49.0%	49.2%	55.2%	55.7%	51.0%
Loss of personal contact with clients	48.4%	54.0%	45.5%	46.7%	48.1%
Available Internet is too slow	43.5%	42.9%	50.0%	46.7%	46.0%
Clients nor prepared to transact online	39.5%	40.5%	38.3%	42.5%	40.6%
Incompatibility with existing systems	38.9%	38.6%	38.9%	42.0%	43.6%
Uncertain about benefits	32.2%	29.8%	35.7%	34.8%	35.7%
Products not suited to Internet sales	30.5%	37.5%	27.9%	29.4%	28.7%
Internal organization resistance	29.9%	28.1%	33.8%	31.2%	30.2%
Suppliers not ready	28.7%	29.4%	29.2%	28.2%	28.7%
Sample Size (i.e. number of responses)	1,400	541	154	167	202

*Color coding highlights where regional variance from state average is 5 percentage points or higher

A key finding is that the importance of barriers varies to only a limited extent from region to region. The most noticeable difference is that the non-metropolitan regions are more likely to cite a lack of internal expertise as a very or somewhat important barrier to adoption of e-solutions.

The **top 5 barriers** that are important factors for more than 48 percent of organizations are:

1. Security concerns
2. Privacy concerns
3. High cost of development/maintenance
4. Lack of internal expertise and knowledge
5. Loss of personal contact with clients

It stands to reason and research shows that barriers do vary with business size. For example, internal organization resistance is more important to larger organizations compared to smaller organizations. Conversely, lack of internal expertise and knowledge for adopting and using e-solutions is more important for smaller organizations. When considering barriers to adoption it is important to recognize the following relationships of barriers to business size.

Addressing expertise and knowledge related to e-solutions can mitigate other barriers, especially security and privacy concerns.

TABLE 17: Barriers that increase or Decrease with Size of Organization

Barriers that increase with ***decreasing*** size	Barriers that increase with ***increasing*** size
Lack of internal expertise and knowledge	Internal organization resistance
Available Internet is too slow	Suppliers not ready
Loss of personal contact with clients	Products not suited to Internet sales

4. Households

4.1 Overview

It is not only Internet utilization by businesses and non-commercial organizations that varies across regions. Utilization by households varies as well. This has implications for delivery of government services, self-employment, remote employment, and access to a range of Internet based services, both commercial and non-commercial. So, to what degree are there differences in household utilization of the Internet across Kentucky? As the following table shows, the Bluegrass region has a distinctly higher level of utilization compared to the other three regions.

TABLE 18: Household Utilization (DEi) by Region

Region	Rank	Average DEI Score	Difference from Average	# Households
Bluegrass	**1**	5.39	0.24	526
West	**2**	5.14	-0.01	381
South	**3**	4.95	-0.20	286
East	**4**	4.92	-0.23	261
Kentucky		5.15		1,454

4.2 Explaining Differences in Household Utilization

Some of the variation in household utilization is a result of factors that impact all regions. These important factors include household income, age and computer skill. The following chart shows the cumulative impact of age and income on utilization as expressed by DEi scores.

TABLE 19: Household Utilization (DEi) by Age and Income

	Household Income				
Respondent Age	Less than $30,000	$30,000 to $49,999	$50,000 to $100,000	More than $100,000	Overall
18 to 34 years	5.09	5.47	5.79	6.84	5.33
35 to 54 years	4.62	5.20	5.72	6.75	5.40
55 to 64 years	4.58	4.85	5.50	6.31	5.14
65 years and over	3.32	4.45	5.23	4.75	4.30
Overall	4.52	4.99	5.61	6.34	

The trend of increasing utilization with increasing household income is consistent for all regions. Similarly, the trend for decreasing utilization over the age of 55 is consistent for all regions.

TABLE 20: Utilization by Median Household Income by Region

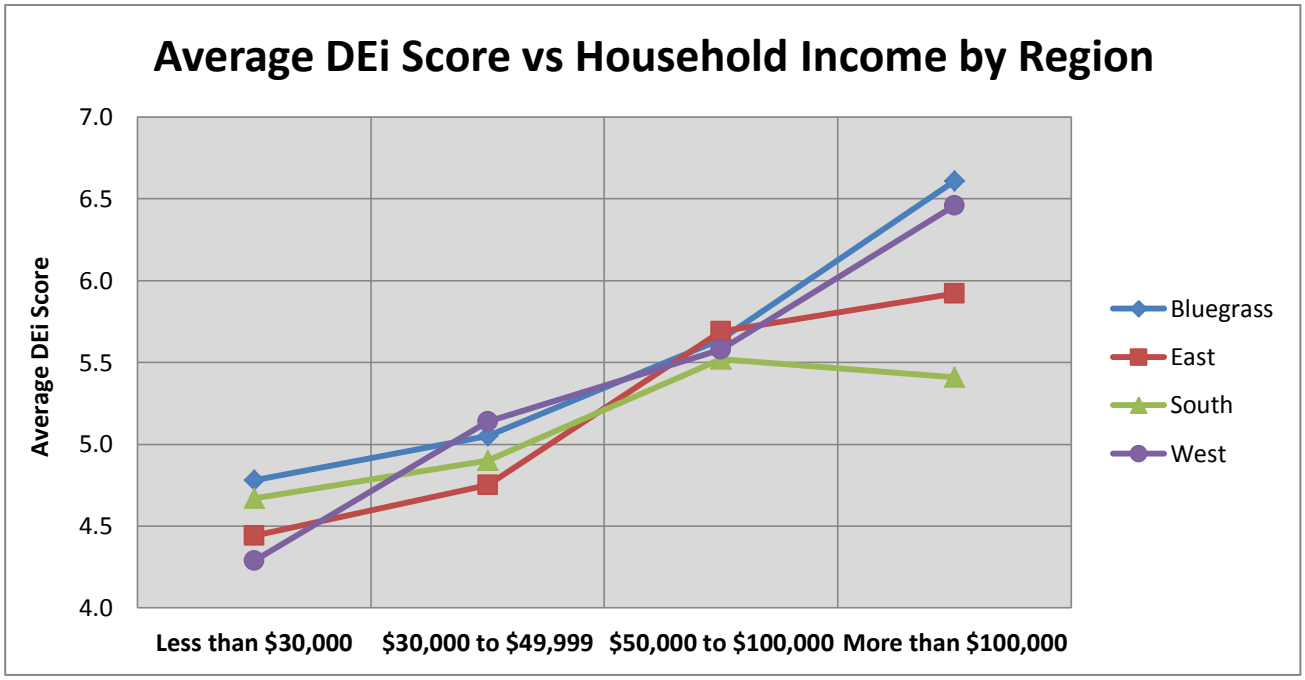
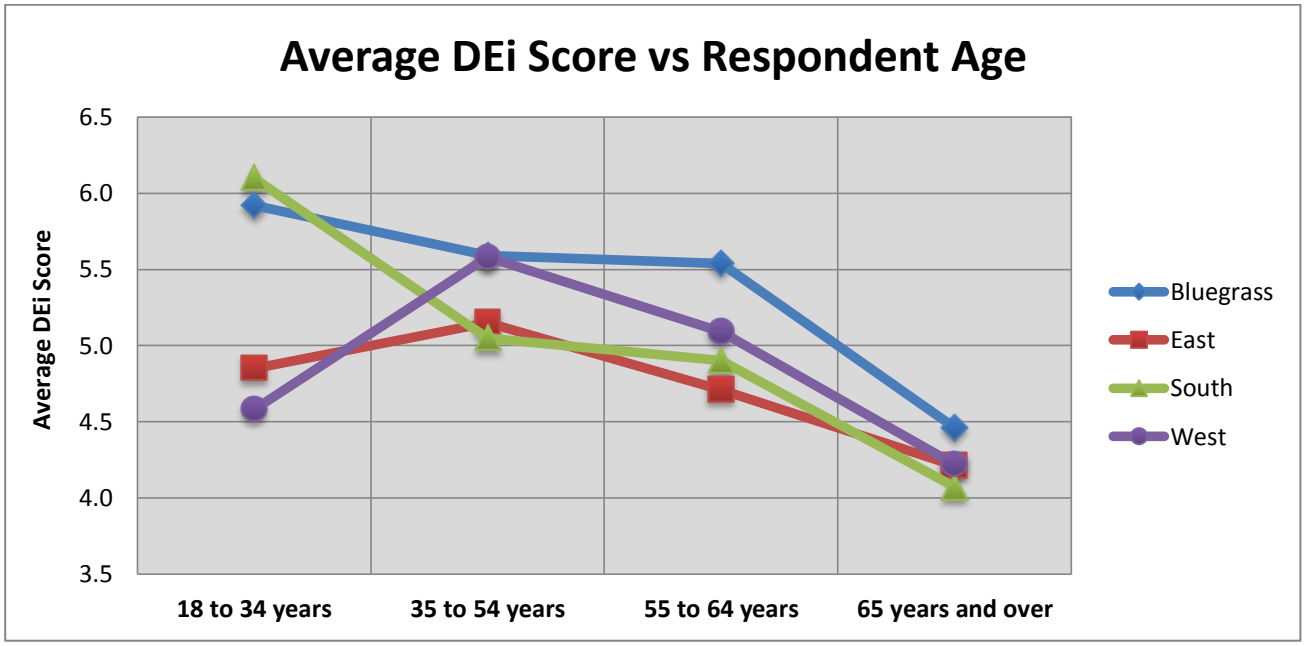


TABLE 21: Utilization by Age by Region



Given the impact of age on utilization, it is useful to acknowledge the different age and income profiles of the four regions. The Bluegrass region stands out as having a significantly higher median income than the other three regions, as well as a slightly younger population. Conversely the three non-metropolitan regions have lower median incomes and a higher percentage of population 65 and older (a key target group).

TABLE 21: Household Income and Age by Region

Region	Median Household Income	Median Age (2009)
Bluegrass	$45,950	35.4
East	$30,782	38.2
South	$32,738	38.0
West	$37,827	37.8

	Population						
Region	Total	Pct. Pop.	Under 18	18 - 34	35 - 49	50 - 64	65 & over
Bluegrass	2,235,183	53.0%	537,605	519,832	473,150	433,165	271,431
East	624,616	14.8%	140,691	130,417	131,277	132,486	89,745
South	655,317	15.5%	153,198	144,823	134,348	129,163	93,785
West	700,081	16.6%	164,792	150,795	136,633	140,613	107,248
State	**4,215,197**	**100.0%**	**996,286**	**945,867**	**875,408**	**835,427**	**562,209**

	Population Share by Age Group				
Region	Under 18	18 - 34	35 - 49	50 - 64	65 & over
Bluegrass	24.1%	23.3%	21.2%	19.4%	12.1%
East	22.5%	20.9%	21.0%	21.2%	14.4%
South	23.4%	22.1%	20.5%	19.7%	14.3%
West	23.5%	21.5%	19.5%	20.1%	15.3%
State	**23.6%**	**22.4%**	**20.8%**	**19.8%**	**13.3%**

Computer skills are also an important factor that directly affects levels of utilization, with lower computer skill levels reflected in lower utilization consistently across all regions. Computer skill levels vary to a limited degree by region, with the Bluegrass region having the highest incidence of expert users. Results for the Bluegrass region can be partly explained by the higher income levels and younger average population.

A more significant factor is the not unexpected relationship between age and computer skill, with individuals 55 and older having noticeably lower skill levels. To maximize the benefits of broadband, it is important to address the improvement of computer and Internet skills among key population groups.

TABLE 22: Computer Skills by Age

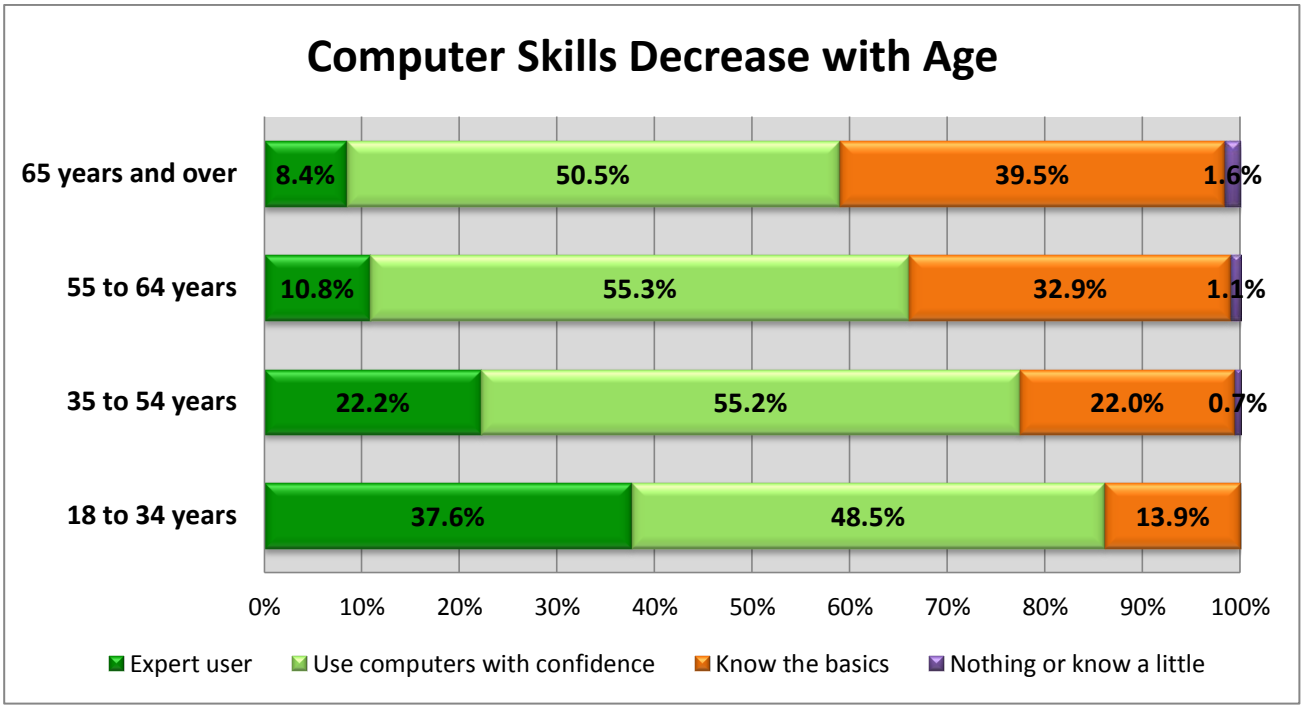
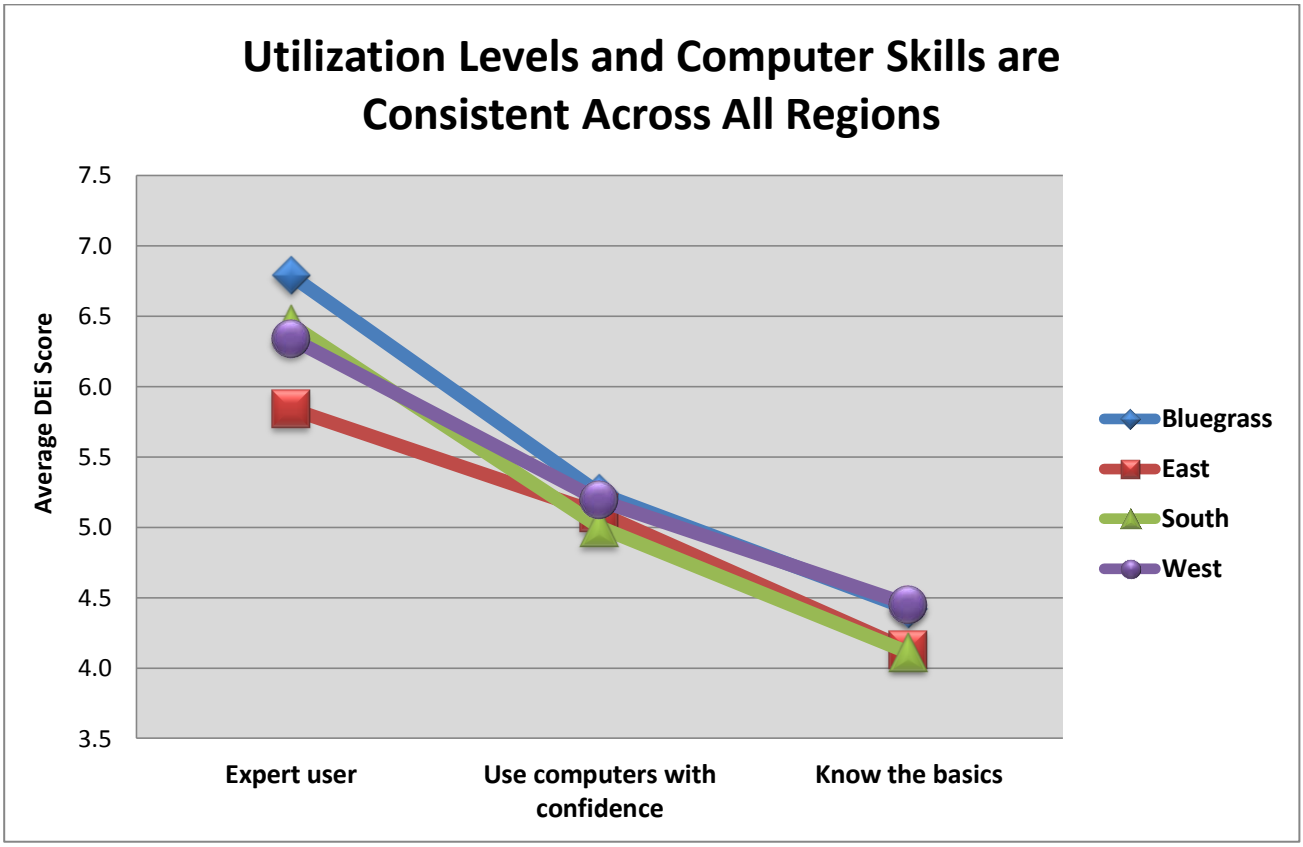


TABLE 23: Utilization (DEi) and Computer Skills by Region



Recommendation #5: Develop training programs and resources that target lower to middle income households over the age of 54.

Households with low computer skills represent an important group due to the social and economic benefits that can be accessed through the Internet. As governments and businesses move their services to the Internet to achieve better reach and cost efficiencies, it is critical that citizens have the ability to access and benefit from these online services. However, a large portion of lower income and older households have difficulty adopting and using the Internet. Given that low adoption and utilization is strongly tied to age and income, training should be targeted at people over 55 with low to moderate

Location Matters: Similar to organizations, household use of e-solutions is impacted by whether a household lives in a metropolitan area or not. Using the US Department of Agriculture's classifications, the following table shows urban (essentially metropolitan) households to have, on average, markedly higher utilization of e-solutions.

TABLE 24: Rural - Urban Household Utilization for All Types of Connectivity

Rural-Urban Category	Ave. DEi Score	# Households
Metropolitan	5.45	459
Micropolitan	5.13	281
Small Town	4.95	310
Isolated Small Town	5.00	404

Dial-Up Hurts Utilization: Not surprisingly, households with dial-up Internet connections also have very much lower levels of utilization, with an average DEi of 3.37 compared to households with broadband who had an average DEi of 5.59. Even within the group of dial-up users, urban households showed higher levels of e-solution utilization.

TABLE 25: Rural - Urban Utilization for Dial-up Households

Rural-Urban Category	Ave. DEi Score	# Households	Dial-up Households as % of Category
Metropolitan	3.58	59	12.9%
Micropolitan	3.47	58	20.6%
Small Town	3.19	60	19.4%
Isolated Small Town	3.27	70	17.3%

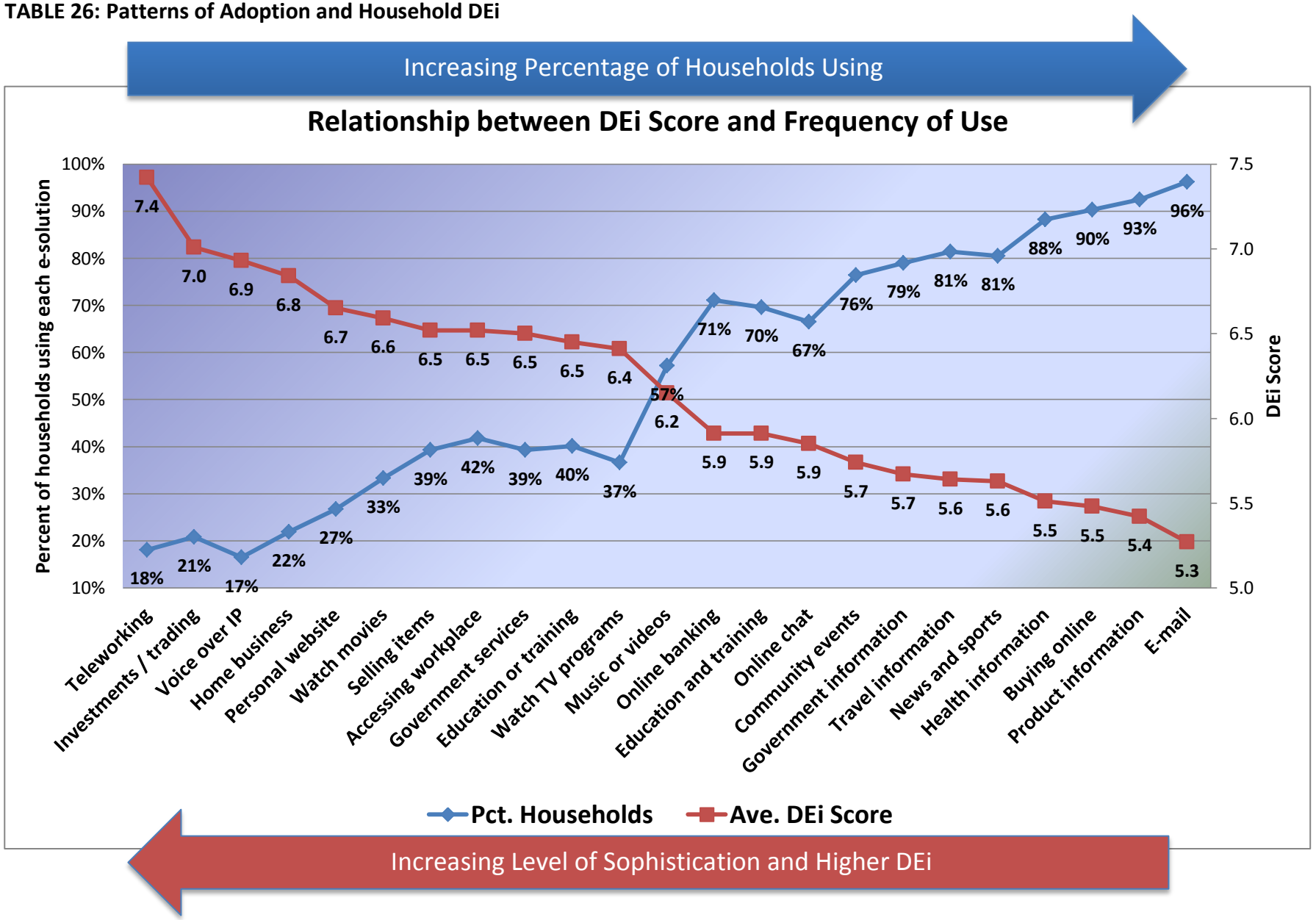
Recommendation #6: Non-metropolitan areas are a priority for Internet training programs and resources.

While both urban and rural households struggle to use and benefit from the Internet, rural households are relatively disadvantaged, being generally older and having lower average incomes. Lastly, rural households tend to have greater difficultly in accessing educational, health and government services, all of which are increasingly available online.

4.3 Areas of High Variation in Utilization

Lack of computer skills is not experienced equally across all types of Internet uses. Some uses are broadly adopted, while others are used by less than 50% of users. Among the less frequently adopted uses, those related to employment and earning income are prominent (see the left side of the table below). Less frequently adopted utilizations tend to be used by those with higher DEi scores (right side of TABLE 26: Patterns of Adoption and Household DEi) – see next page for ***Relationship Between DEi Score and Frequency of Use*** in Table 26.

TABLE 26: Patterns of Adoption and Household DEi



4.4 The Impact of Lower Utilization on Households

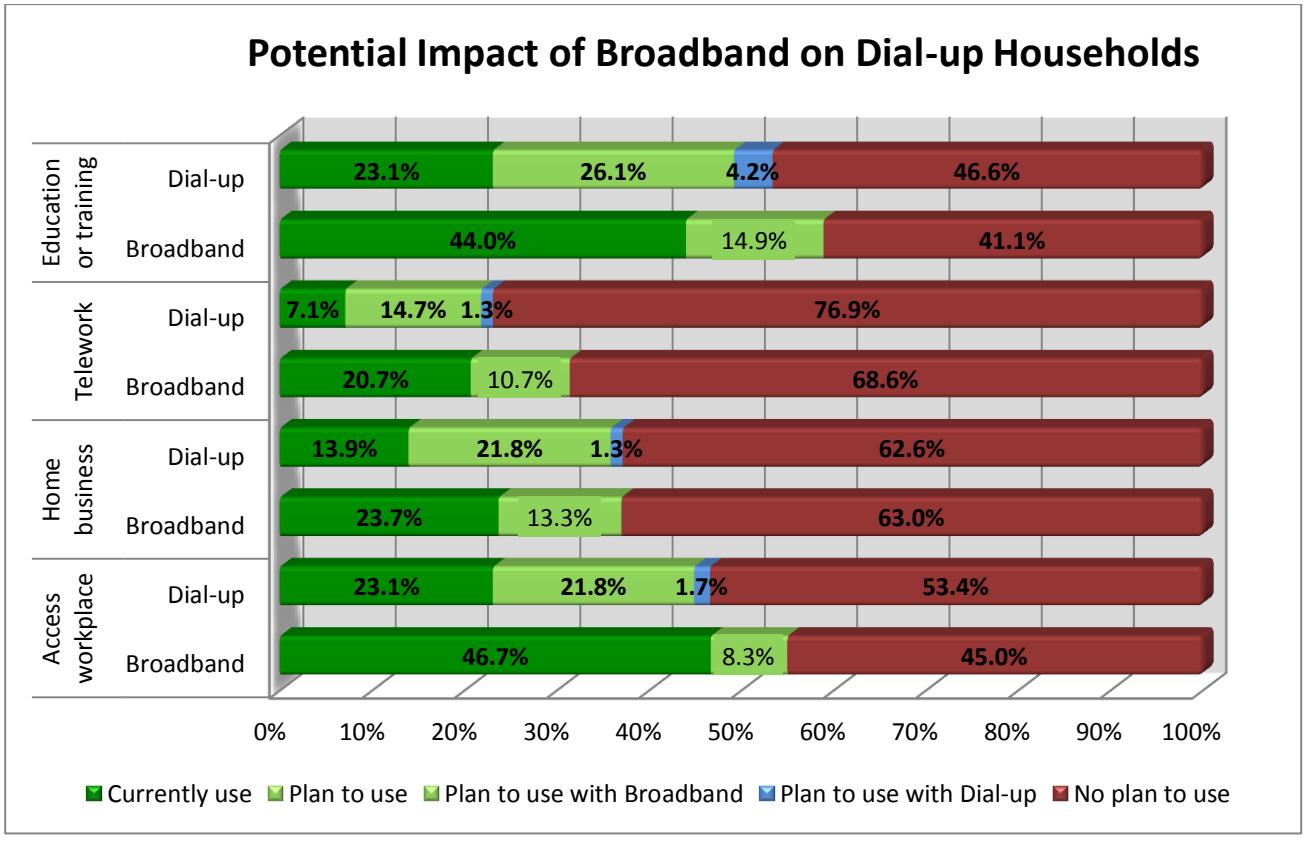
Looking at the different regions in Kentucky, it is clear that regions with the lowest skill levels and utilization have the lowest use of the Internet for personal productivity and earning income. The following table shows how regions perform in four areas that have major impact on employment and earning income. Areas shaded in green have higher than average utilization, while those in red have lower than average utilization. As in other utilization categories, the Bluegrass region leads, with the non-metropolitan regions lagging.

TABLE 27: Percentage of Houses Currently Using Internet for Productivity Uses

Productivity Category	Bluegrass	East	South	West
Accessing workplace	49.2%	36.8%	39.7%	36.8%
Home business	28.1%	16.5%	19.4%	19.3%
Teleworking	23.6%	14.7%	14.0%	16.0%
Education or training courses	42.9%	38.1%	38.4%	39.0%

The impact of moving from dial-up to broadband is particularly visible on household productivity. As seen in Table 28, a large portion of households with dial-up connections indicate that they plan to move to broadband with the intention of adopting new productivity applications.

TABLE 28: Difference in Use Between Households with Dial-up and Broadband Connectivity



4.5 How People Prefer to Learn

In the previous section, the issue of gaps in utilization by household and regional characteristics was explored. Closely related is the issue of how households acquire the skills required to overcome those gaps, especially their lack of technical skills and discomfort with technology.

So what are the preferred means for people to acquire the skills and knowledge needed to overcome gaps in utilization? The following charts outline the preferences for dial-up households and seniors. What is evident across all groups is the strong preference for informal means of acquiring information, either through talking to others (especially among seniors – 65+) and self-directed online information. Formal courses and face-to-face classes are by far the least preferred means of learning for all groups.

Table 29: Preferred Learning Methods for Dial-up Households

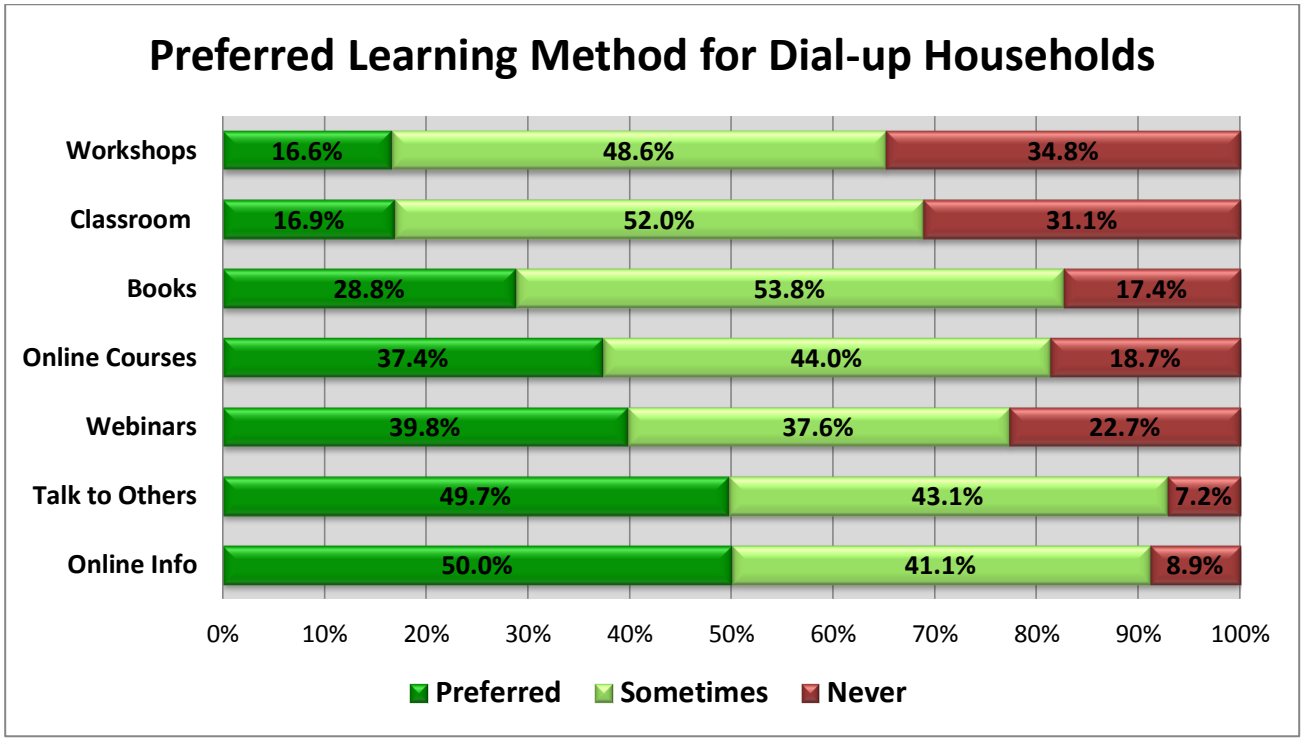
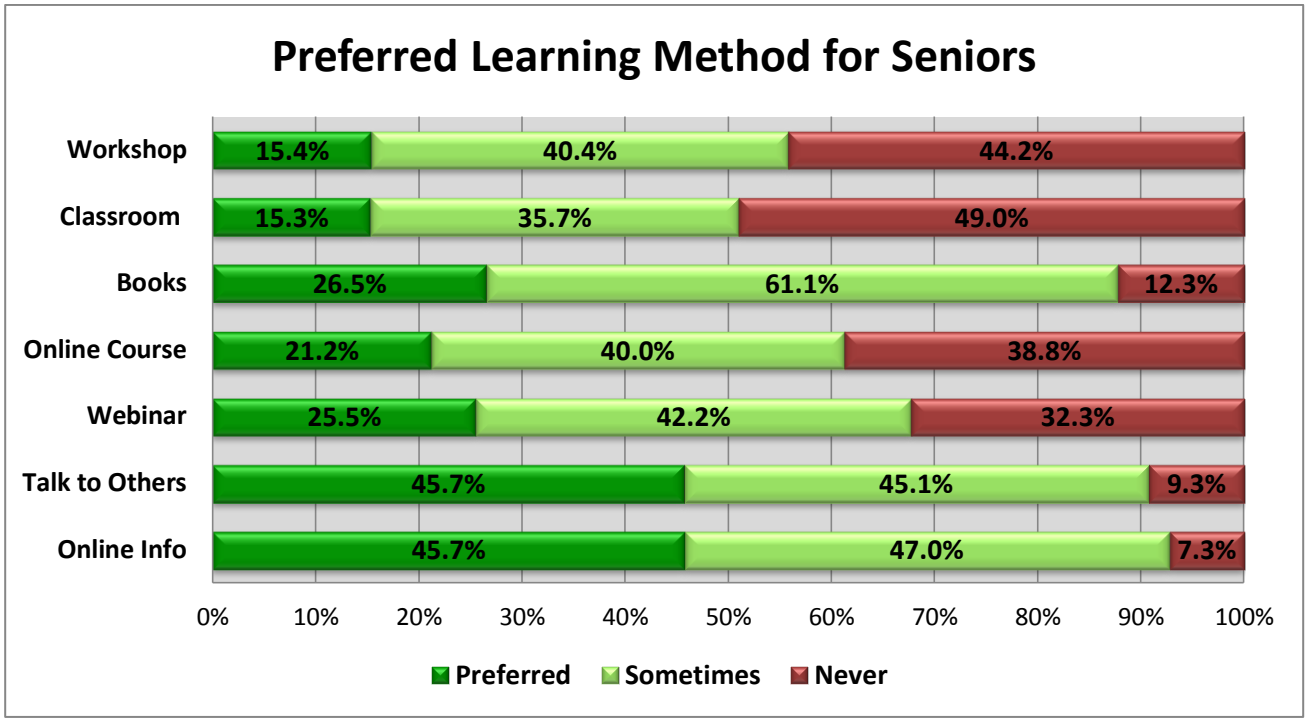


Table 30: Preferred Learning Methods for Seniors



Recommendation #7: In designing initiatives to increase and improve Internet utilization by households and organizations, considerable weight should be given to those learning methods that are preferred by the target populations.

Rather than trying to entice target populations into existing programs (such as classroom courses), e-solution adoption initiatives should reflect the preference for both self-directed online resources, as well as existing informal networks that already have participation by these target groups. These can include seniors centers, libraries, churches and community centers.

5. Summary and Next Steps

This report sets analyzes how organizations and households in Kentucky utilize broadband. It considers different industry sectors and household types and regional variations within those groupings. It also considers what kinds of actions will improve their performance and how they could benefit further from broadband. A further report will be developed in early 2012 after a second and more comprehensive round of data collection.

The objective of benchmarking utilization of the Internet is to provide "actionable intelligence" to governments, stakeholders, and individuals. Taking action on the recommendations included in this report will enable Kentucky to move towards the realization of further benefits from broadband.

Appendix 1: Breakdown of Regions by County

South	*West*	*Bluegrass*	*East*
Whitley	Logan	Campbell	Greenup
Knox	Todd	Pendleton	Boyd
McCreary	Christian	Harrison	Lawrence
Wayne	Trigg	Bourbon	Martin
Clinton	Calloway	Clark	Pike
Cumberland	Marshall	Madison	Floyd
Monroe	Graves	Garrard	Knott
Allen	Fulton	Jessamine	Letcher
Simpson	Hickman	Fayette	Harlan
Warren	Carlisle	Scott	Bell
Edmonson	Ballard	Owen	Leslie
Barren	McCracken	Grant	Perry
Hart	Livingston	Boone	Breathitt
Metcalfe	Lyon	Kenton	Owsley
Adair	Crittendon	Gallatin	Lee
Russell	Caldwell	Carroll	Wolfe
Pulaski	Hopkins	Trimble	Estill
Laurel	Muhlenberg	Oldham	Powell
Clay	Butler	Clark	Menifee
Jackson	Ohio	Jefferson	Morgan
Rock Castle	Grayson	Bullit	Johnson
Lincoln	Breckenridge	Meade	Elliot
Casey	Hancock	Hardin	Carter
Taylor	Daviess	Henry	Magoffin
Green	Henderson	Larue	Lewis
	Webster	Nelson	Mason
	Union	Spencer	Robertson
	McLean	Shelby	Fleming
		Franklin	Bracken
		Anderson	Rowan
		Marion	Nicholas
		Washington	Bath
		Mercer	Montgomery
		Boyle	
		Woodford	

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